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- (c) an isolated nucleic acid molecule that hybridizes with a nucleic acid sequence of (a) or (b) under the following hybridization conditions: 5 x Denhards, 5 x SSPE, 5% SDS, 20 µg/mL salmon sperm DNA at 55 °C;
- (d) an isolated nucleic acid molecule that hybridizes with a nucleic acid sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:14, and SEQ ID NO:15, under the following hybridization conditions: 5 x Denhards, 5 x SSPE, 5% SDS, 20 µg/mL salmon sperm DNA at 55 °C; and
- (e) an isolated nucleic acid fragment that is complementary to (a), (b), (c) or (d).

- 22 2. The isolated nucleic acid fragment of Claim 1 selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:14, and SEQ ID NO:15.
- 23 3. A polypeptide encoded by the isolated nucleic acid fragment of Claim 1.
- 24 4. The polypeptide of Claim 3 selected from the group consisting of SEQ ID NO:2, and SEQ ID NO:4.
- 25 5. An isolated nucleic acid fragment encoding a tobacco MFP1 polypeptide, the peptide having at least 77% identity to SEQ ID NO:17.
- 26 6. An MFP1 polypeptide encoded by the nucleic acid fragment of Claim 5.
- 27 7. A chimeric gene comprising the isolated nucleic acid fragment of either of Claims 1 or 5 operably linked to suitable regulatory sequences.
- 28 8. A transformed host cell comprising a host cell and the chimeric gene of Claim 7.
- 29 9. The transformed host cell of Claim 8 wherein the host cell is a plant cell.
- 30 10. The transformed host cell of Claim 8 wherein the host cell is *E. coli*.
- 31 11. A method of altering the level of expression of a plant MFP1 protein in a host cell comprising:
- (a) transforming a host cell with the chimeric gene of Claim 7 and;
- (b) growing the transformed host cell produced in step (a) under conditions that are suitable for expression of the chimeric gene
- resulting in production of altered levels of a plant MFP1 protein in the transformed host cell relative to expression levels of an untransformed host cell.
- 32 12. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a tobacco MFP1 protein comprising:
- (a) probing a cDNA or genomic library with the nucleic acid fragment of Claim 1,

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- (b) identifying a DNA clone that hybridizes with the nucleic acid fragment of Claim 1; and
- (c) sequencing the cDNA or genomic fragment that comprises the clone identified in step (b),

wherein the sequenced cDNA or genomic fragment encodes a tobacco MFP1 protein

33. 13. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a tobacco MFP1 protein comprising:

- (a) synthesizing at least one oligonucleotide primer corresponding to a portion of the sequence selected from the group consisting of SEQ ID NO:1, SEQ ID NO:3, SEQ ID NO:14, and SEQ ID NO:15;
- (b) amplifying a cDNA insert present in a cloning vector using the oligonucleotide primer of step (a);

wherein the amplified cDNA insert encodes a tobacco MFP1 protein.

34. 14. The product of the method of Claims 12 or 13.

35. 15. An isolated nucleic acid fragment encoding a soybean MFP1 protein selected from the group consisting of:

- (a) an isolated nucleic acid fragment encoding all or a substantial portion of the amino acid sequence as set forth in SEQ ID NO:20;
- (b) an isolated nucleic acid fragment that is substantially similar to an isolated nucleic acid fragment encoding all or a substantial portion of the amino acid sequence as set forth in SEQ ID NO:20;
- (c) an isolated nucleic acid molecule that hybridizes with a nucleic acid sequence of (a) or (b) under the following hybridization conditions: 5 x Denhards, 5 x SSPE, 5% SDS, 20 µg/mL salmon sperm DNA at 55 °C;
- (d) an isolated nucleic acid molecule that hybridizes with a nucleic acid sequence as set forth in SEQ ID NO:19 under the following hybridization conditions: 5 x Denhards, 5 x SSPE, 5% SDS, 20 µg/mL salmon sperm DNA at 55 °C; and
- (e) an isolated nucleic acid fragment that is complementary to (a), (b), (c) or (d).

36. 16. The isolated nucleic acid fragment of Claim 15 as set forth in SEQ ID NO:19.

37. 17. A polypeptide encoded by the isolated nucleic acid fragment of Claim 15.

38. 18. The polypeptide of Claim 17 as set forth in SEQ ID NO:20.

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39 19. A nucleic acid fragment, isolated from soybean, encoding an MFP1 polypeptide, the polypeptide having at least 46% identity to SEQ ID NO:17 over a length of 388 amino acids as compared by the Jotun-Hein algorithm.

40 20. An MFP1 polypeptide encoded by the nucleic acid fragment of Claim 19.

41 21. A chimeric gene comprising the isolated nucleic acid fragment of either of Claims 19 or 20 operably linked to suitable regulatory sequences.

42 22. A transformed host cell comprising a host cell and the chimeric gene of Claim 21.

43 23. The transformed host cell of Claim 22 wherein the host cell is a plant cell.

44 24. The transformed host cell of Claim 22 wherein the host cell is *E. coli*.

45 25. A method of altering the level of expression of a plant MFP1 protein in a host cell comprising:

- (a) transforming a host cell with the chimeric gene of Claim 21 and;
- (b) growing the transformed host cell produced in step (a) under conditions that are suitable for expression of the chimeric gene

resulting in production of altered levels of a plant MFP1 protein in the transformed host cell relative to expression levels of an untransformed host cell.

46 26. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a soybean MFP1 protein comprising:

- (a) probing a cDNA or genomic library with the nucleic acid fragment of Claim 19;
- (b) identifying a DNA clone that hybridizes with the nucleic acid fragment of Claim 19; and
- (c) sequencing the cDNA or genomic fragment that comprises the clone identified in step (b),

wherein the sequenced cDNA or genomic fragment encodes a soybean MFP1 protein

47 27. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a soybean MFP1 protein comprising:

- (a) synthesizing at least one oligonucleotide primer corresponding to a portion of the sequence as set forth in SEQ ID NO:19;
- (b) amplifying a cDNA insert present in a cloning vector using the oligonucleotide primer of step (a);

wherein the amplified cDNA insert encodes a corn MFP1 protein.

48 28. The product of the method of Claims 26 or 27.

49 29. An isolated nucleic acid fragment encoding a corn MFP1 protein selected from the group consisting of:

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- (a) an isolated nucleic acid fragment encoding all or a substantial portion of the amino acid sequence as set forth in SEQ ID NO:22;
- (b) an isolated nucleic acid fragment that is substantially similar to an isolated nucleic acid fragment encoding all or a substantial portion of the amino acid sequence as set forth in SEQ ID NO:22;
- (c) an isolated nucleic acid molecule that hybridizes with a nucleic acid sequence of (a) or (b) under the following hybridization conditions: 5 x Denhards, 5 x SSPE, 5% SDS, 20 µg/mL salmon sperm DNA at 55 °C;
- (d) an isolated nucleic acid molecule that hybridizes with a nucleic acid sequence as set forth in SEQ ID NO:21 under the following hybridization conditions: 5 x Denhards, 5 x SSPE, 5% SDS, 20 µg/mL salmon sperm DNA at 55 °C; and
- (e) an isolated nucleic acid fragment that is complementary to (a), (b), (c) or (d).

50 30. The isolated nucleic acid fragment of Claim <sup>49</sup>29 as set forth in SEQ ID NO:21.

51 31. A polypeptide encoded by the isolated nucleic acid fragment of Claim <sup>49</sup>29.

52 32. The polypeptide of Claim <sup>51</sup>31 as set forth in SEQ ID NO:22.

53 33. A nucleic acid fragment, isolated from corn, encoding an MFP1 polypeptide, the polypeptide having at least 40% identity to SEQ ID NO:17, over a length of about 672 amino acids as compared by the Jotun-Hein algorithm.

54 34. An MFP1 polypeptide encoded by the nucleic acid fragment of Claim 33.

55 35. A chimeric gene comprising the isolated nucleic acid fragment of either of Claims <sup>49</sup>29 or <sup>53</sup>33 operably linked to suitable regulatory sequences.

56 36. A transformed host cell comprising a host cell and the chimeric gene of Claim <sup>55</sup>35.

57 37. The transformed host cell of Claim <sup>56</sup>36 wherein the host cell is a plant cell.

58 38. The transformed host cell of Claim <sup>56</sup>36 wherein the host cell is *E. coli*.

59 39. A method of altering the level of expression of a plant MFP1 protein in a host cell comprising:

- (a) transforming a host cell with the chimeric gene of Claim <sup>55</sup>35 and;
- (b) growing the transformed host cell produced in step (a) under conditions that are suitable for expression of the chimeric gene

resulting in production of altered levels of a plant MFP1 protein in the transformed host cell relative to expression levels of an untransformed host cell.

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40. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a corn MFP1 protein comprising:

- (a) probing a cDNA or genomic library with the nucleic acid fragment of Claim 29;
- (b) identifying a DNA clone that hybridizes with the nucleic acid fragment of Claim 29; and
- (c) sequencing the cDNA or genomic fragment that comprises the clone identified in step (b),

wherein the sequenced cDNA or genomic fragment encodes a corn MFP1 protein

41. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a corn MFP1 protein comprising:

- (a) synthesizing at least one oligonucleotide primer corresponding to a portion of the sequence as set forth in SEQ ID NO:21;
- (b) amplifying a cDNA insert present in a cloning vector using the oligonucleotide primer of step (a);

wherein the amplified cDNA insert encodes a corn MFP1 protein.

42. The product of the method of Claims 40 or 41.

43. An isolated nucleic acid fragment encoding a rice MFP1 protein selected from the group consisting of:

- (a) an isolated nucleic acid fragment encoding all or a substantial portion of the amino acid sequence as set forth in SEQ ID NO:24;
- (b) an isolated nucleic acid fragment that is substantially similar to an isolated nucleic acid fragment encoding all or a substantial portion of the amino acid sequence as set forth in SEQ ID NO:24;
- (c) an isolated nucleic acid molecule that hybridizes with a nucleic acid sequence of (a) or (b) under the following hybridization conditions: 5 x Denhards, 5 x SSPE, 5% SDS, 20 µg/mL salmon sperm DNA at 55 °C;
- (d) an isolated nucleic acid molecule that hybridizes with a nucleic acid sequence as set forth in SEQ ID NO:23 under the following hybridization conditions: 5 x Denhards, 5 x SSPE, 5% SDS, 20 µg/mL salmon sperm DNA at 55 °C; and
- (e) an isolated nucleic acid fragment that is complementary to (a), (b), (c) or (d).

44. The isolated nucleic acid fragment of Claim 43 as set forth in SEQ ID NO:23.

45. A polypeptide encoded by the isolated nucleic acid fragment of Claim 43.

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- 66 46. The polypeptide of Claim 45 as set forth in SEQ ID NO:24.
- 67 47. A nucleic acid fragment, isolated, from rice, encoding a rice MFP1 polypeptide, the polypeptide having at least 39% identity to SEQ ID NO:17 over a length of 107 amino acids as compared by the Jotun-Hein algorithm.
- 68 48. An MFP1 polypeptide encoded by the nucleic acid fragment of Claim 47.
- 69 49. A chimeric gene comprising the isolated nucleic acid fragment of either of Claims 43 or 47 operably linked to suitable regulatory sequences.
- 70 50. A transformed host cell comprising a host cell and the chimeric gene of Claim 49.
- 71 51. The transformed host cell of Claim 50 wherein the host cell is a plant cell.
- 72 52. The transformed host cell of Claim 50 wherein the host cell is *E. coli*.
- 73 53. A method of altering the level of expression of a plant MFP1 protein in a host cell comprising:
- (a) transforming a host cell with the chimeric gene of Claim 43 and;
  - (b) growing the transformed host cell produced in step (a) under conditions that are suitable for expression of the chimeric gene resulting in production of altered levels of a plant MFP1 protein in the transformed host cell relative to expression levels of an untransformed host cell.
- 74 54. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a rice MFP1 protein comprising:
- (a) probing a cDNA or genomic library with the nucleic acid fragment of Claim 43;
  - (b) identifying a DNA clone that hybridizes with the nucleic acid fragment of Claim 43; and
  - (c) sequencing the cDNA or genomic fragment that comprises the clone identified in step (b),
- wherein the sequenced cDNA or genomic fragment encodes a rice MFP1 protein
- 75 55. A method of obtaining a nucleic acid fragment encoding all or a substantial portion of the amino acid sequence encoding a rice MFP1 protein comprising:
- (a) synthesizing at least one oligonucleotide primer corresponding to a portion of the sequence as set forth in SEQ ID NO:23;
  - (b) amplifying a cDNA insert present in a cloning vector using the oligonucleotide primer of step (a);
- wherein the amplified cDNA insert encodes a rice MFP1 protein.
- 76 56. The product of the method of Claims 54 or 55.